

What is claimed is:

1. A method of forming a trench for use in manufacturing a semiconductor device, said method comprising:
 - forming an insulation film on a substrate;
 - forming a photoresist pattern on the insulation film;
 - performing a first etching process comprising etching the insulation film using the photoresist pattern as a mask to form an initial trench in the insulation film; and
 - subsequently performing a second etching process that is distinct from said first etching process, said second etching process comprising etching the insulation film in which the initial trench has already been formed to thereby enlarge the initial trench.
2. The method of claim 1, further comprising removing the photoresist pattern after the initial trench is formed and prior to the second etching process.
3. The method of claim 1, wherein said enlarging the initial trench comprises increasing a width of the initial trench while maintaining a depth of the initial trench.
4. The method of claim 1, wherein said forming of the insulation film comprises forming one of an oxide film, a fluoride film and a nitride film on the substrate.
5. The method of claim 4, wherein the second etching process comprises

immersing the substrate into a bath containing an etching solution.

6. The method of claim 4, wherein the second etching process comprises spraying an etching solution onto the insulation layer while the substrate is being rotated.

7. The method of claim 4, wherein the second etching process comprises wetting the insulation film an etching solution that etches an oxide or fluoride.

8. The method of claim 7, wherein the etching solution includes hydrogen fluoride (HF), ammonium fluoride (NH₄F), hydrogen peroxide (H₂O₂) and deionized water (H₂O).

9. The method of claim 8, wherein the etching solution includes hydrogen fluoride, ammonium fluoride and deionized water in a volume ratio of about 1:1-10:1-10:100-500.

10. The method of claim 7, wherein said second etching process comprises etching the insulation film at a rate of about 40 to about 60 Å/minute.

11. The method of claim 7, wherein the etching solution further comprises an antioxidant.

12. The method of claim 11, wherein the antioxidant comprises benzo triazole (BTA).

13. The method of claim 4, wherein the second etching process comprises wetting the insulation film with an etching solution that etches a nitride.

14. The method of claim 13, wherein the etching solution includes hydrogen fluoride, phosphoric acid (H_3PO_4) and deionized water.

15. The method of claim 13, wherein the etching solution further comprises an antioxidant.

16. The method of claim 15, wherein the antioxidant includes benzo triazole.

17. A method of forming an isolation film for use in manufacturing of a semiconductor device, said method comprising:

forming a photoresist pattern on a substrate;

performing a first etching process comprising etching the substrate using the photoresist pattern as a mask to form an initial trench in the substrate;

subsequently performing a second etching process that is distinct from said first etching process, said second etching process comprising etching the substrate in which the initial trench is already formed to thereby enlarge the initial trench; and

subsequently forming an oxide film that fills the enlarged trench.

18. The method of claim 17, wherein said forming of the oxide film comprises forming an initial oxide film on the substrate in and around the enlarged

trench, and subsequently removing a portion of the initial oxide film from a top surface of the substrate while leave another portion of the initial oxide film in the enlarged trench.

19. The method of claim 17, wherein said second etching process comprises wetting the substrate with an etching solution that etches silicon.

20. The method of claim 19, wherein the etching solution includes hydrogen fluoride, nitric acid (HNO_3) and deionized water.

21. A method of forming a conductive pattern for use in manufacturing a semiconductor device, said method comprising:

forming an insulation film on a substrate;

forming a photoresist pattern on the insulation film;

performing a first etching process comprising etching the insulation film using the photoresist pattern as a mask to form an initial trench in the insulation film; and

subsequently performing a second etching process that is distinct from said first etching process, said second etching process comprising etching the insulation film in which the initial trench is already formed to thereby enlarge the initial trench; and

depositing a conductive material in the enlarged trench to form a conductive pattern in the insulation film.

22. The method of claim 21, wherein the second etching process is performed using an etching solution including hydrogen fluoride, ammonium fluoride,

hydrogen peroxide and deionized water.

23. The method of claim 21, wherein the second etching process is performed using etching solution including hydrogen fluoride, phosphoric acid and deionized water.

24. The method of claim 21, wherein said material deposited in the enlarged trench comprises copper, aluminum or tungsten.

25. The method of claim 24, wherein said second etching process is performed using an etching solution including benzo triazole to prevent the conductive material from oxidizing.

26. A method for manufacturing a semiconductor device comprising:
forming a first insulation film on a substrate;
forming a first conductive pattern in the insulation film;
forming at least one etch stop layer and at least one second insulation film in the foregoing sequence on the first insulation film;
forming a first photoresist pattern on the second insulation film;
etching the etch stop layer and the second insulation film using the first photoresist pattern as a mask to form a via hole that exposes the first conductive pattern by removing the first photoresist pattern;
subsequently forming a second photoresist pattern on the second insulation film, the second photoresist pattern having an opening aligned with the via hole;
etching the etch stop layer and the second insulation film using the second

photoresist pattern as a mask to thereby form an initial trench aligned with the via hole;

subsequently etching the second insulation film to enlarge the initial trench; and

depositing a conductive material in the via hole and in the enlarged trench to thereby form a second conductive pattern and a third conductive pattern in the via hole and in the enlarged trench, respectively.